

Editorial

New Developments in Time Series and Forecasting, ITISE-2023 [†]

Olga Valenzuela ¹, Fernando Rojas ², Luis Javier Herrera ², Hector Pomares ² and Ignacio Rojas ^{2,*}

¹ Department of Applied Mathematics, University of Granada, 18071 Granada, Spain; olgavc@ugr.es

² Department of Computer Engineering, Automation and Robotics, CITIC-UGR, University of Granada, 18071 Granada, Spain; frojas@ugr.es (F.R.); jherrera@ugr.es (L.J.H.); hector@ugr.es (H.P.)

* Correspondence: irojas@ugr.es

[†] All papers are presented at the 9th International Conference on Time Series and Forecasting, Gran Canaria, Spain, 12–14 July 2023.

1. Introduction

The ITISE 2023 (9th International Conference on Time Series and Forecasting) sought to provide a discussion forum for scientists, engineers, educators and students about the latest ideas and realizations in the foundations, theory, models and applications for interdisciplinary and multidisciplinary research encompassing the disciplines of computer science, mathematics, statistics, forecaster, econometric, etc., in the field of time series analysis and forecasting.

ITISE 2023 solicited high-quality original research papers (including significant work-in-progress) on any aspect of time series analysis and forecasting in order to motivate the generation and use of knowledge and new computational techniques and methods on forecasting in a wide range of fields.

As in previous editions, ITISE 2023 was held in Gran Canaria (Spain), with the dates being 12–14 July 2023.

2. Main Topics of ITISE

As is well known, ITISE aims to provide a friendly discussion forum for scientists, engineers, educators and students to discuss the latest ideas and achievements in the fundamentals, theory, models and applications in the field of time series analysis and forecasting. More specifically, the main topics of ITISE are:

1. Time series analysis and forecasting

- Nonparametric and functional methods;
- Vector processes;
- Probabilistic approaches to modeling macroeconomic uncertainties;
- Uncertainties in forecasting processes;
- Nonstationarity;
- Forecasting with many models. Model integration;
- Forecasting theory and adjustment;
- Ensemble forecasting;
- Forecasting performance evaluation;
- Interval forecasting;
- Data preprocessing methods: data decomposition, seasonal adjustment, singular;
- Spectrum analysis, detrending methods, etc.

2. Econometrics and forecasting

- Econometric models;
- Economic and econometric forecasting;
- Real macroeconomic monitoring and forecasting;



Citation: Valenzuela, O.; Rojas, F.; Herrera, L.J.; Pomares, H.; Rojas, I. New Developments in Time Series and Forecasting, ITISE-2023. *Eng. Proc.* **2023**, *39*, 101. <https://doi.org/10.3390/engproc2023039101>

Published: 19 September 2023



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- Advanced econometric methods.
3. Advanced methods and on-line learning in time series
 - Adaptivity for stochastic models;
 - On-line machine learning for forecasting;
 - Aggregation of predictors;
 - Hierarchical forecasting;
 - Forecasting with computational intelligence;
 - Time series analysis with computational intelligence;
 - Integration of system dynamics and forecasting models.
 4. High-dimension and complex/big data
 - Local vs. global forecasts;
 - Dimension reduction techniques;
 - Multiscaling;
 - Forecasting complex/big data.
 5. Forecasting in real problems
 - Health forecasting;
 - Atmospheric science forecasting;
 - Telecommunication forecasting;
 - Hydrological forecasting;
 - Traffic forecasting;
 - Tourism forecasting;
 - Marketing forecasting;
 - Modelling and forecasting in power markets;
 - Energy forecasting;
 - Climate forecasting;
 - Financial forecasting and risk analysis;
 - Forecasting electricity load and prices;
 - Forecasting and planning systems.

3. Special Session in ITISE-2023

During ITISE-2023, several Special Sessions were carried out. Special Sessions are a very useful tool in order to complement the regular program with new and emerging topics of particular interest for the participating community. Special Sessions that emphasized multidisciplinary and transversal aspects, as well as cutting-edge topics, were especially encouraged and welcomed, and in this edition of ITISE-2023, the following were received:

- SS1. Advances in time series analysis and forecasts in Engineering Sciences.

It is well-known that time series analysis is time-consuming when large data sets are used, and soft computing methods are recommended for obtaining a balance between the models' accuracy and speed of solving the problem at hand. Therefore, this Special Session aimed to present the advances in the fields of time series modeling and forecasting of large series issued from measurements and experiments in different engineering fields. Submissions were expected to reflect theoretical methods and experimental works in statistical analysis and applications to modeling such time series.

Suggested topics of this Special Session include but are not limited to:

- Parametrical versus non-parametric approaches for data series modeling in engineering sciences;
- Critical evaluation and comparisons of alternative approaches for experimental time series modeling;
- New techniques for spatial data analysis;
- New software for data analysis—development and applications for solving engineering problems;
- Soft computing and fuzzy techniques for engineering time series modeling;

- Environmental time series modeling (precipitation, temperature, pollution).

The participants will be invited to submit their extended articles to the following journals:

- Advances in Water, Air and Soil Pollution Monitoring, Modeling and Restoration
- Hydrology (MDPI)—indexed within Scopus, ESCI (Web of Science)—tracked for Impact Factor—CiteScore 3.6—<https://www.mdpi.com/journal/hydrology> (12 July 2023)

Organizers: Prof. Dr. Hab. Alina Bărbulescu, Transilvania University of Braşov, Romania.

- SS2. Advanced econometric methods for Economic analysis and Finance

This Special Session focused on the application of advanced econometric methods to economic analysis and finance. Three authors presented in this session. Their presentations included advanced methods for macroeconomic data decomposition, a microeconomic assessment of tightening monetary policy impact on firm debt overhang, and a financial econometric analysis of the relation between the energy sector and the financial markets.

Organizer: Prof. Paolo Canofari, an Associate Professor in Economic Policy at the Università Politecnica delle Marche (UNIVPM) in Italy.

- SS3. Cryptocurrency time series modelling and forecasting

The cryptocurrency market, or rather more generally the cryptoasset market, is a field that is rapidly and steadily growing. Similarly, the literature regarding this topic has also enormously grown over the last few years. What distinguishes this market from the traditional financial market is that it operates 24/7 and every day, contrarily to the majority of traditional financial markets that operate within particular hours and only on business days. Moreover, what we already know about cryptoasset market is that it is characterized by wide heterogeneity, in terms of different aspects—both from the perspective of the supply and the demand. Most of the studies and most of the available methodologies for the analysis of the behavior of cryptoasset prices are focused on the data of daily frequency. Therefore, the literature using daily cryptoasset data is already quite exhausted. On the other hand, there are not many studies that make use of high-frequency data. It is important to distinguish the aggregated high-frequency data (e.g., the data that contain weighted-average of prices/volumes from multiple major cryptocurrency exchanges, available for instance on [coinpaprika.com](https://www.coinpaprika.com) up to 5 min frequency) and the tick-to-tick on-exchange data that are also openly available. Therefore, such availability of high-frequency tick-to-tick data provides a great opportunity to not only develop the cryptoasset research field but also the field of high-frequency financial data in general, which has constantly growing been over the last decade or two.

Therefore, the aim of this session was to discuss the studies that focus on the usage of high-frequency cryptoasset data, since this field requires more attention in the literature because of the large gaps up to this point.

Organizer: Prof. Damian Zięba, University of Warsaw, Faculty of Economic Sciences, Department of Quantitative Finance, Warsaw, Poland.

- SS4. Artificial Intelligence and Sustainability

I encourage you to contribute a research or comprehensive review article for consideration for publication in *Sustainability*, an international Open Access journal which provides an advanced forum for research findings in areas related to sustainability and sustainable development. *Sustainability* publishes original research articles, review articles and communications. I am confident you will find that the journal contributes to enhancing understanding of sustainability and fostering initiatives and applications of sustainability-based measures and activities.

Organizers: Prof. Ebrahim Ghaderpour, Assistant Professor in Department of Earth Sciences at Sapienza University of Rome

4. Plenary Talk in ITISE-2023

In this edition of ITISE, we are honored to have hosted the following invited speakers:

1. Prof. Eamonn Keogh, Distinguished Professor, Department of Computer Science and Engineering University of California Riverside. Title of the presentation: Irrational Exuberance: Has Deep Learning Contributed Anything to Time Series problems?
2. Prof. Martin Wagner, Professor of Economics at the University of Klagenfurt. Chief Economic Advisor at the Bank of Slovenia and Fellow of the Macroeconomics and Economic Policy group at the Institute for Advanced Studies, Vienna. Title of the presentation: Sources and Channels of Nonlinearities and Instabilities of the Phillips Curve: Results for the Euro Area and Its Member States
3. Prof. Daniel Peña Sanchez De Rivera, Professor at Universidad Carlos III de Madrid. Department of Statistics. Madrid (Spain). Title of the presentation: Finding the Number of Clusters in Time Series

These plenary lectures strengthened the aim of this conference for the diffusion and discussion of high-quality research from some of the most recognized scientists in their fields.

5. Peer-Review Statement and MDPI *Engineering Proceedings*

As in previous editions, for ITISE 2023, a selection of papers were published in *Engineering Proceedings* (ISSN2673-4591). The first volume of *Engineering Proceedings* with the contributions of the congress was published for ITISE 2021 [1], as well as for ITISE 2022 [2].

In submitting conference proceedings to *Engineering Proceedings*, the volume editors of the proceedings certify to the publisher that all papers published in this volume have been subjected to peer review performed by the volume editors. Reviews are conducted by expert referees adhering to the professional and scientific standards expected of a proceedings journal. The type of peer review was single-blind, and the conference submission management system was Easychair (319 contributions were submitted), presenting in these proceedings a selection of such contributions which, on average, have been reviewed by at least two expert reviewers.

Funding: This research received no external funding.

Conflicts of Interest: The editors declare no conflict of interest.

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